Supplementary Information

Construction of Lanthanum Vanadate/Functionalized-Boron Nitride Nanocomposite: The Electrochemical Sensor for Monitoring of Furazolidone

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Materials, Reagents and Measurements.

Lanthanum (III) nitrate hexahydrate ($La(NO_3)_3.6H_2O$), ammonium metavanadate (NH_4VO_3), BN, hydroquinone (HQ), ethanol and all other chemicals (including interfering species) were purchased from Sigma-Aldrich and used without further purification. All the solutions in the experiments were prepared with ultrapure double ionized (DI) water.

Instruments

Field emission scanning electron microscope (FESEM, ZEISS Sigma 300 microscope) and high-resolution transmission electron microscopy (HRTEM, Shimadzu JEM-1200 EX, 200 kV) were used to study the morphology of the as-prepared samples. The composition and crystal structures of the nanomaterials were analyzed by X-ray diffraction (XRD) on an XPERT-PRO diffractometer (PANalytical B.V., The Netherlands) with Cu-Kα radiation (λ = 1.5406 Å) in the 2θ scan range from 10° to 90°. The chemical and surface electronic state of the nanomaterial was scrutinized by X-ray photoelectron spectroscopy (XPS; Thermo scientific multi-lab 2000).

Electrochemical impedance spectroscopy (EIS) measurements were examined by using ZAHNER scientific instruments (THALES software package). Chemical composition of nanocomposite was performed on a Fourier transform infrared analysis (JASCO 6600, FT-IR) spectrophotometer. All the electrochemical measurements were performed on a CHI 750A Electrochemical workstation (CH Instruments (*USA*)) with a conventional three-electrode system composed of a platinum wire (Pt) as the auxiliary electrode, an Ag/AgCl saturated KCl as reference electrode and a bare or modified glassy carbon working electrode/rotating disk GCE (GCE/ RDGCE), respectively. All the electrochemical experiments were carried out in a nitrogen atmosphere at room temperature.

Functionalization of F-BN

The F-BN was synthesized by a simple sonochemical approach in this work [**61**]. The h-BN (5 g) and HQ (0.1 M) were added to 50 mL of DI water by sonochemical method. The precursor was constantly sonicated at room temperature for 1 h. Finally, a white product was collected by centrifugation and washed with DI water. Afterwards, the final sample (F-BN) was dried in an oven at 60 °C for 12 h.

Synthesis of LaV/F-BN nanocomposite

Briefly, 0.5 M of NH_4VO_3 was dissolved in 50 mL of DI water and was stirred for 30 min at a certain temperature. Subsequently, 0.5 M of La $(NO_3)_3{\cdot}6H_2O$ was added to the above solution. After stirring for a few minutes, the above mixture was transferred to a 100 mL Teflon lined autoclave and kept at 180 °C for 12 h. After the reaction, the obtained product (LaV) was rinsed several times with DI water/ethanol and collected by centrifugation. Finally, the LaV was dried and calcined at 400 °C for 2 h. F-BN (60%) and LaV (40%) were dispersed in DI water at 50 °C and sonicated for 30 mins to form homogeneous ink. Then, LaV/F-BN nanocomposite was washed for few times and dried at 60°C overnight.

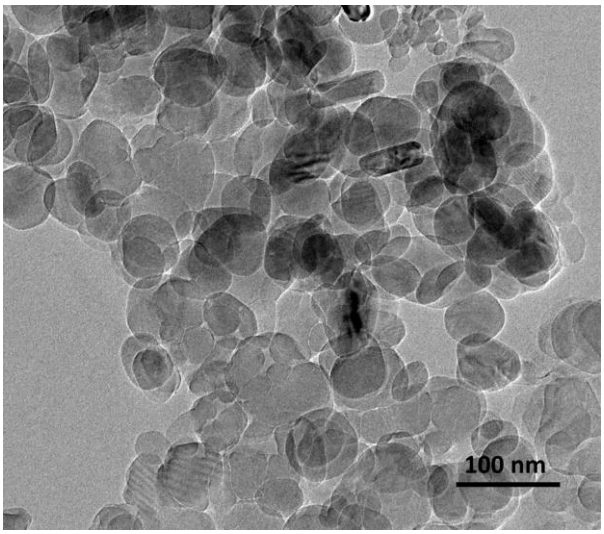

Fig. S1 TEM image of h-BN.

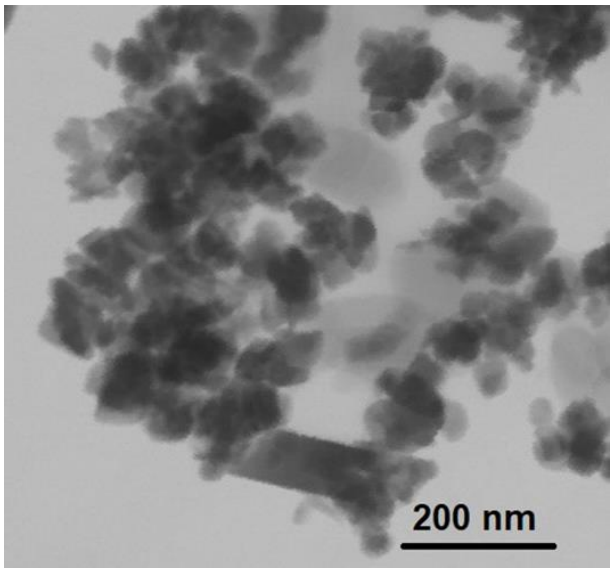

Fig. S2 HAADF-STEM of LaV/F-BN nanocomposite.

To understand the surface nature in terms of specific surface area BET analysis was carried out. The N_2 - adsorption and desorption isotherms of the samples are given in **Fig. S3**. The isotherms obtained for all three samples could be assigned to type III isotherm, suggests the mesoporous nature of the samples. The measured specific BET surface area of F-BN, LaV and LaV/F-BN is 48.78, 21.98 and 30.56 m^2 g^{-1} respectively. The high specific surface area of F-BN is due to the interspace between the irregular arrangement of F-BNs, which is in agreement with

the TEM images. In comparison with LaV, the larger surface area observed for the LaV/F-BN composite indicates the intra-space between the LaV and F-BN sheets.

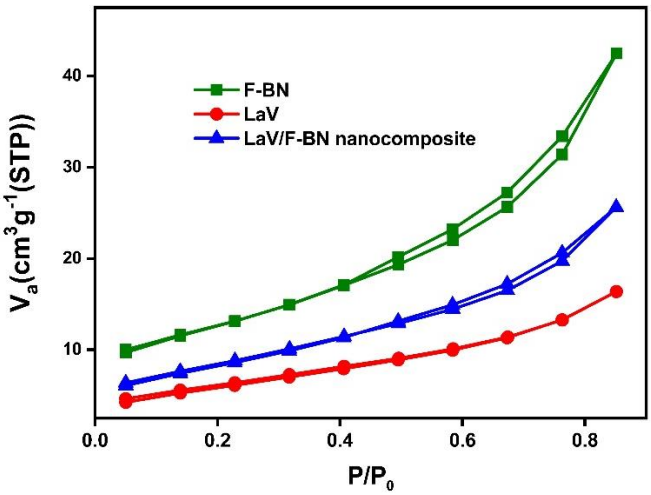

Fig. S3 BET N_2 adsorption-desorption curves of LaV, F-BN and LaV/F-BN nanocomposite.

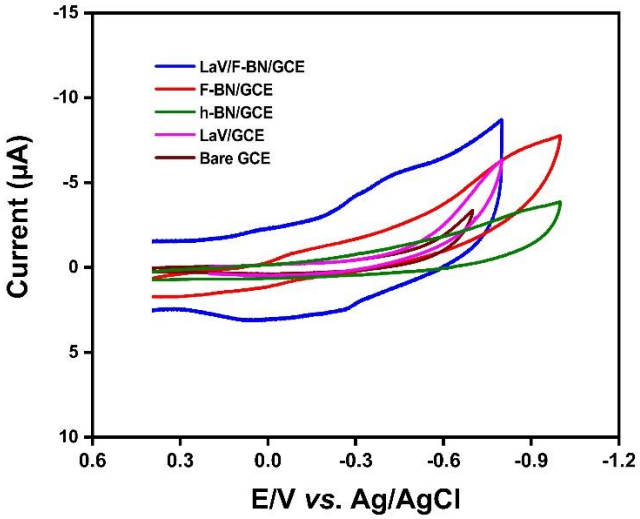

Fig. S4 CV signals of bare and modified electrodes in the 0.05M PB (pH 7.0) without FZD.

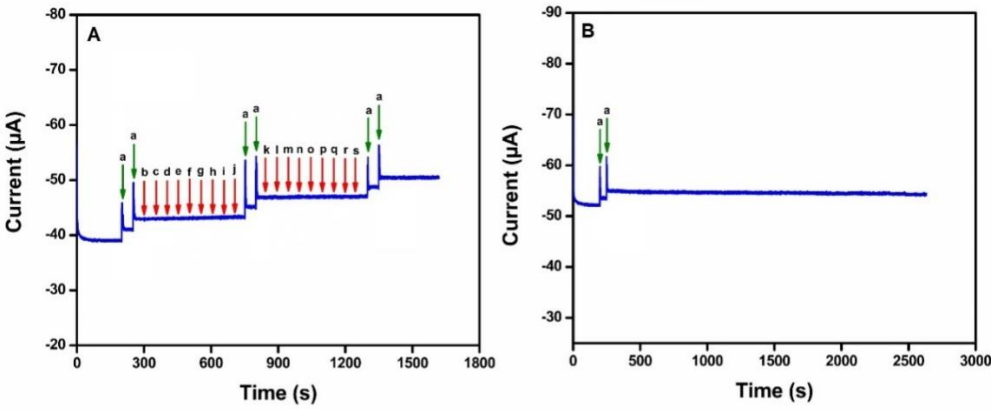

Fig. S5 (A) Selectivity test of LaV/F-BN/RDGCE with the successive addition of 100 μM FZD (a) and higher concentration of interfering species (b–s) in 0.05 M PB (pH 7.0). (B) The operational stability of the LaV/F-BN/RDGCE.

Table S1 FZD detection in human blood serum and urine samples.

Samples	FZD Added (μM)	FZD Found (μM)	Recovery (%)
Human blood serum	–	–	–
	1.00	0.95	95.00
	2.00	1.97	98.50
	3.00	2.90	96.70
Human urine	–	–	–
	1.00	0.97	97.00
	2.00	1.95	97.50
	3.00	2.95	98.30